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Deep-sea Fishes of the Bermuda Oceanographic Expeditions.
Family Serrivomeridae. Part II: Genus *Platuronides*.¹

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(Text-figures 1-14).

INTRODUCTION.

For detailed data in regard to nets, locality, dates, etc., concerning the capture of the deep-sea eels treated in this monograph, refer to *Zoologica*, Vol. XIII, Nos. 1, 2 and 3 and Vol. XX, No. 1, pp. 1-2. For physical data, methods of measurement and definitions of growth stages, see *Zoologica*, Vol. XVI, No. 1. The genus *Serrivomer* has been discussed in *Zoologica*, Vol. XX, No. 3. A definition and discussion of the family Serrivomeridae will be found at the end of the present paper (p. 346).

The drawings in the present paper are the work of George Swanson.

Genus *Platuronides* Roule and Bertin, 1924.

Generic Characters (Adults): Snout less than half length of head; gradually tapering, not sharply constricted in front of eye; vomerine teeth conical or compressed, widely or not widely separated but not forming a ridge as high or as continuous as in *Serrivomer*. Trunk decreasing gradually in height and thickness from shoulder to tail; no nuchal constriction; no caudal filament; jaws strong, the lower slightly the longer; maxillary and mandibular teeth small, pointed, in one to six rows; structure and arrangement of vomerine teeth various, as mentioned above; nostrils tubular or non-tubular; pectorals vestigial; dorsal beginning well behind pectorals and continuing to tip of the tail; anal origin immediately behind anus, at a distance about mid-way between pectoral base and dorsal origin, and continuing to the end of the body; posterior portions of dorsal and anal fins relatively rigid with densely crowded rays which form, with the rudimentary true caudal fin, a semi-rhombic pseudo-caudal; about 50 anal rays in the last 3.5 per cent. of the total length of the fish, and more than 50 rays occupying a space per ray of less than one-tenth of 1 per cent. of the total length; lateral line without pores.

Young transitional adolescents (elvers) of *Platuronides*, in which the specialized development of dorsal and anal rays is not yet conspicuous, can be told at a glance from *Serrivomer* of similar length by the compression of the posterior part of the body, as opposed to its roundness in *Serrivomer*,

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and by the lack of silvery pigmentation, which is pronounced in immature *Serrivomer*.

Discussion: Three species of *Platuronides* have been described, all from Bermuda and the Bahamas, two of them having been taken by the Bermuda Oceanographic Expeditions.

Platuronides danae, described from a single 486 mm. specimen taken in the Bahamas, and since taken off Bermuda by the present expeditions, is a perfectly distinct species characterized by having the vomerine teeth all conical, widely separated and set in a single line, and by having the anterior nostril tubular.

Platuronides ophiocephalus and *P. acutus*, however, both described by Parr in 1932 from single specimens taken off Bermuda, may very possibly prove to be synonymous for the following reasons: The two species differ from each other chiefly in the dentition, which, in *P. ophiocephalus*, consists of fewer teeth more regularly arranged than in *P. acutus*; however, the type specimens measured, respectively, 632 mm. and only 220 mm. in length, and our studies on the development of the teeth in *Serrivomer* (see *Zoologica*, Vol. XX, No. 3) have shown similar and equally radical differences in the teeth of specimens of different sizes; furthermore, the largest specimens of *P. acutus* in the present collection are smaller than the type and, though plainly referable to this species, show still more teeth, even less regularly arranged. Again, the differences in proportions, including the major one of the width between sphenotic prominences ("less than 20 per cent greater than the interorbital width" in *P. ophiocephalus*, and "about 40 per cent greater" in *P. acutus*) also may easily be growth characters; it is more than 40 per cent greater in our specimens which, as has been said, are all smaller than the type. As a final, but slight, indication of synonymy, it may be mentioned that all of the leptocephali of this genus taken by us off Bermuda plainly belong to only the two species, *P. danae* and *P. acutus*. Definite synonymy, however, cannot be established until specimens intermediate in size between the two type specimens have been secured.

An additional specific character found in the present specimens is the vertebral count, about 165 to 170 in *P. danae* and about 153 to 158 in *P. acutus*.

Larvae: The leptocephalus of *Platuronides* resembles that of *Serrivomer*, having the same type of snout, total number of myomeres (about 153 to 168) and the same posterior position of the anus. In addition, it metamorphoses at about the same length, the largest larvae of both genera being 61 and 62 mm. long. *Platuronides* leptocephali differ, however, from those of *Serrivomer* as follows:

1. There are 102 to 125 pre-anal myomeres, not 89 to 97 (as in *S. beanii*).

2. The younger larvae (between 18 and 40 mm. in length²) are more slender than corresponding stages of *Serrivomer*, the maximum depth, excluding gut and finfolds, being contained 10 to 17 times (6 to 10 per cent.) in the length, instead of 7.8 to 8.3 (12 to 13 per cent.). The extreme larval range of depth is 8.4 to 17 (6 to 12 per cent.) in the length in *Platuronides*, and 7.8 to 9.6 (10.4 to 13 per cent.) in *Serrivomer*.

3. Pigment spots are present only on either side of the midline far back on the tip of the tail and, farther forward, in a single row, below the midline, where not more than half a dozen, well separated, are scattered before and behind the level of the anus. The anterior five of these chromatophores are quite constant in position, occurring at or near the 96th, 104th, 113th, 122nd and 130th myomeres; they may be designated by the letters A, B, C, D and E, respectively. Some or all of the series, however—es-

² No specimens shorter than 18 mm. were taken.

pecially chromatophore A—may be minute or lacking, particularly in large specimens; also it frequently happens that a chromatophore is visible on only one side of the body; a final variable factor is the distance of the pigment spot from the midline.

Unlike the arrangement in *Serrivomer*, chromatophores are entirely lacking both along the base of the anal fin and in oblique series outlining the myomeres.

Leptocephali of *P. acutus* in the present collection measure between 18 and 62 mm. in length, while those of *P. danae* range from 31 to 61 mm. Within these limits, the following key is applicable:

Pre-anal myomeres 108 to 115 ³ ; anus between chromatophores C and D, or, in smallest specimens, B and C.....	<i>P. acutus</i>
Pre-anal myomeres 122 to 125; anus between chromatophores D and E.....	<i>P. danae</i>

Platuronides danae Roule and Bertin, 1924.

SPECIMENS TAKEN BY THE BERMUDA OCEANOGRAPHIC EXPEDITIONS.

7 specimens; May to September, 1929 to 1931; 50 to 1,000 fathoms; from a cylinder of water 8 miles in diameter (5 to 13 miles south of Non-such Island, Bermuda), the center of which is at 32° 12' N. Lat., 64° 36' W. Long.; standard lengths from 31 to 488 mm.

SPECIMEN PREVIOUSLY RECORDED.

1 specimen; about 350 fathoms; off Bahama Islands; length 486 mm.

DESCRIPTION OF ADULT.

(Text-figs. 1, 2C).

(Based upon the description of the type, and upon the 488 mm. Bermuda specimen).

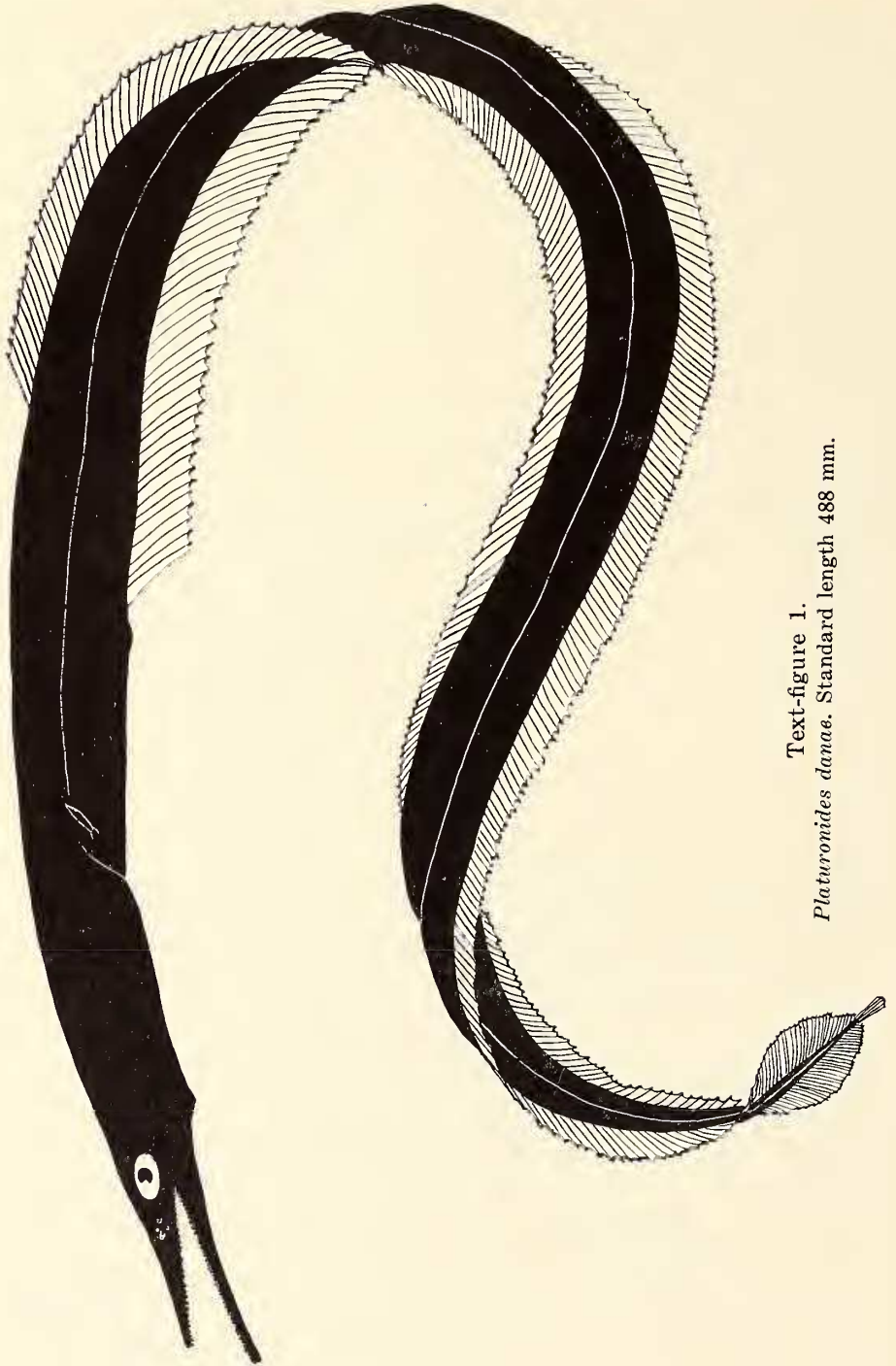
Color: The fresh Bermuda specimen was dark bronze, finely dotted with black specks. Of the type specimen, Roule and Bertin write (1929, p. 50): "La coloration est noirâtre, sans reflets irisés, avec le ventre plus foncé que le dos. Les iris sont bleuâtres." It is probable that these notes were made upon the preserved specimen, in which case the lack of iridescence is easily explained. On the other hand, the difference may be sexual: the Bermuda specimen is a male; the sex of the type is not stated.

Proportions: Maximum depth (immediately behind head) in length 33.5 to 35 (2.9 to 3 per cent.); head in length 6.1 to 6.3 (16.4 to 16.5 per cent.); eye (horizontal) in head 11 to 12.4 (1.3 to 1.5 per cent. of length); snout in head 3.4 to 3.45 (4.7 per cent. of length); lower jaw slightly longer than upper; vomer projecting less than one-sixth length of snout beyond tip of maxillary; interorbital width in length 69 to 70 (1.43 to 1.44 per cent.); intersphenotic width in length (Bermuda specimen only) 51 (2 per cent.); intersphenotic width 26 per cent. greater than interorbital width; snout to dorsal origin in length 2.9 to 3 (33 to 34 per cent.); snout to anal origin in length 3.75 to 3.8 (26 to 27 per cent.).

Nostrils: Anterior nostril tubular.

Teeth: (Text-figs. 3-5). The maxillary teeth of the type specimen are described (*loc. cit.* p. 49) as occurring in a single row in each ramus, and as being quite long and pointed, their length equalling about one-eighth the

³ Except in 18 mm. specimen, which has only 102 pre-anal myomeres, though typical in every other way.



Text-figure 1.
Platuronides danae. Standard length 488 mm.

vertical diameter of the eye; about 50 maxillary teeth are shown in the figure in each ramus. Before clearing and staining, the teeth of the 488 mm. Bermuda specimen agreed very well with this description. Afterwards, however, it was evident that, in addition to the 39 to 42 teeth in a row in each maxillary ramus, there is an outer series of minute denticles, in an irregularly double row.

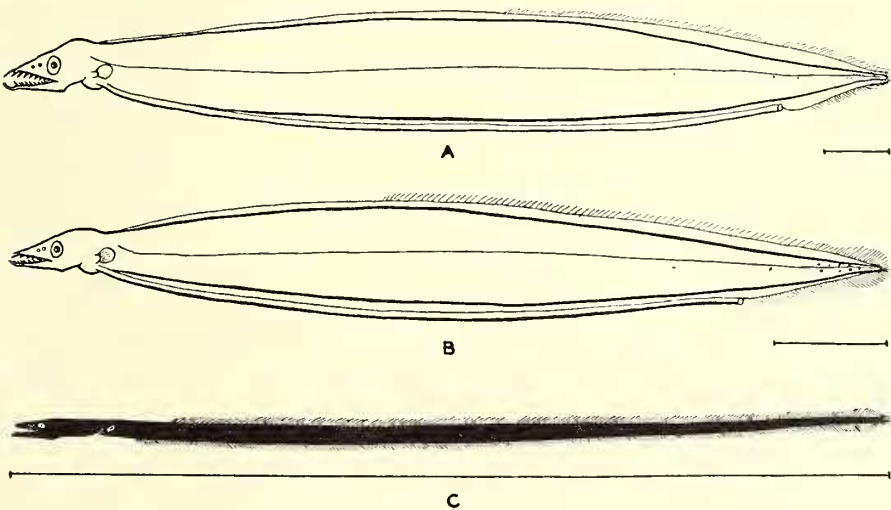
The mandibular teeth, not mentioned in the type description, number 39 to 44 in each ramus in the Bermuda specimen, all except three or four being set in a practically straight line on the outer margin of the jaw. The top of the latter bone is broad and flat, and along its inner margin, well separated from the row of teeth, is a row of very minute denticles, broken by several full-sized teeth in each jaw. This row is evidently the remains of a regular row of teeth such as is found in *Serrivomer*. Traces of a third, median row are also present. The full-sized mandibular teeth are twice as long as the longest teeth in the maxillary and, like them, are conical with the tips slightly recurved.

There are 16 teeth on the vomer, arranged in an irregularly single line. The anterior nine are relatively small and close set, and similar to those of the maxillary in size and shape. The posterior seven, however, representing the vomerine ridge of *Serrivomer*, are broad, flat, as long as the mandibular teeth, and well separated from each other. There are a number of marks of lost teeth on the vomer.

Fins: Pectoral rays 6 or 7, equal in length to vertical diameter of eye, inserted at upper angle of branchial clef. Dorsal rays 170, anal rays 166 in type, about the same in Bermuda specimen.

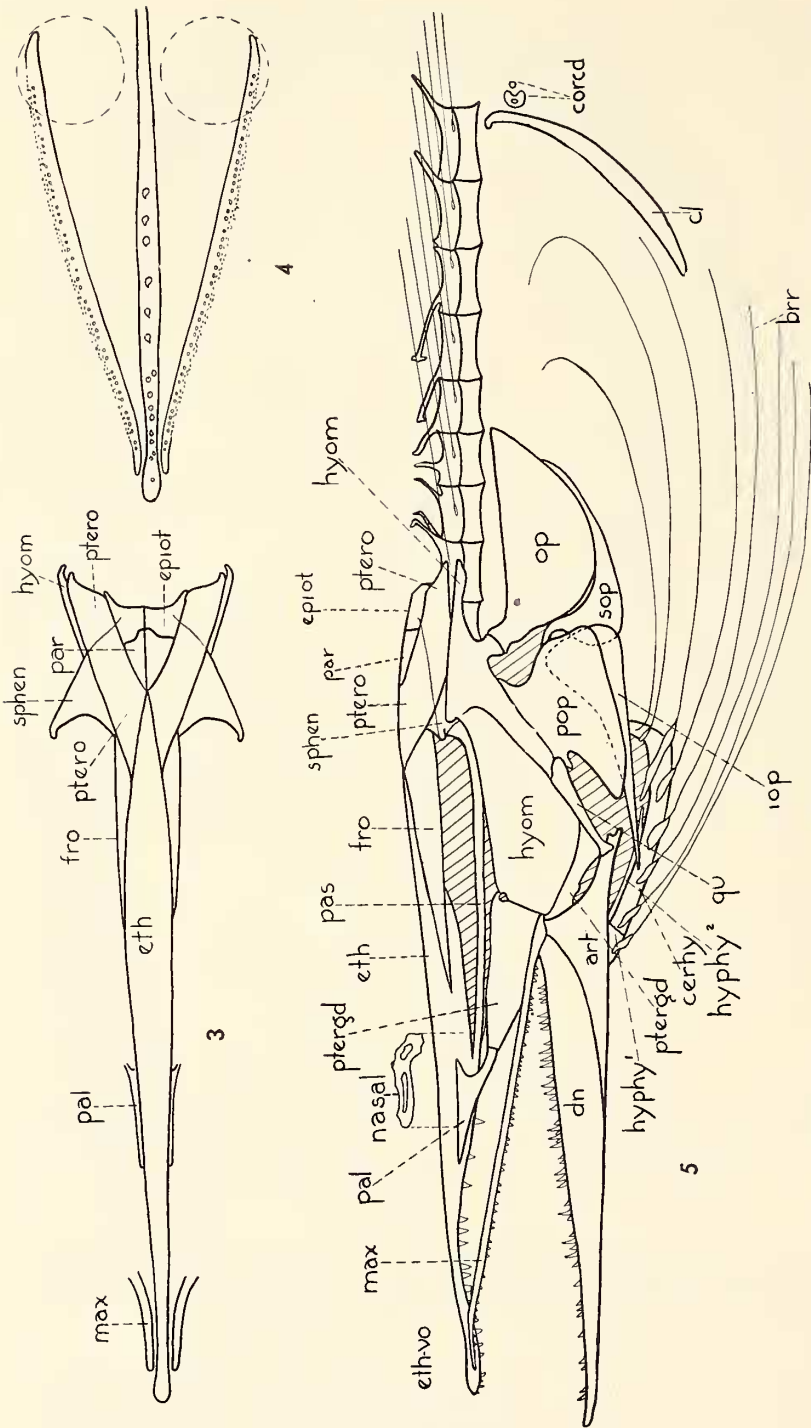
Osteology: (Text-figs. 3-7). The entire skeleton of *Platuronides danae*, as observed in the 488 mm. Bermuda specimen, is very similar to that of *Serrivomer*, both in relative positions of the bones and, in most cases, in their forms and proportions. The following differences may, however, be pointed out:

1. The skull of *Platuronides danae* is both longer and broader than that of *Serrivomer*. This is due chiefly to the greater extent of the pterotics.



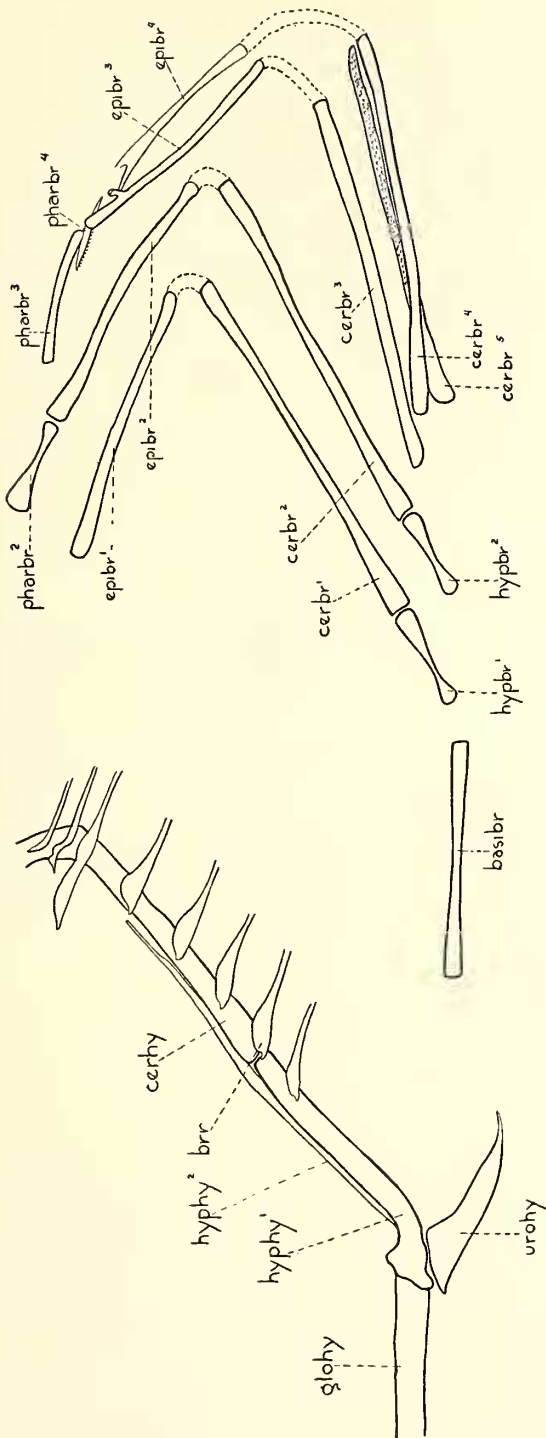
Text-figure 2.

Platuronides danae. A, larva, 36 mm.; B, larva, 61 mm.; C, adult, 488 mm.



Text-figures 3-5.

Platuronides danae. 3. Skull of adult, dorsal view; standard length 488 mm. (x 2.2). 4. Same, teeth of upper jaw and vomer, ventral view. (x 2.2). 5. Same, bones of head, pectoral girdle and anterior part of vertebral column, lateral view. (x 2.2).



Text-figure 6.
Platuronides danae. Hyoid and branchial apparatus of adult, standard length 488 mm. (x 3.9).

2. The ethmo-vomer, correlated with the lighter burden of the teeth, is more slender.
3. The maxillary in this species and, according to Parr (1932, p. 6) in *P. ophiocephalus*, extends almost to the tip of the ethmo-vomer, instead of ending far behind it, as in *Platuronides acutus* and in both species of *Serrivomer* studied.
4. The articular and interopercular are both larger than in *Serrivomer*.
5. The pharyngeal teeth are less highly developed.

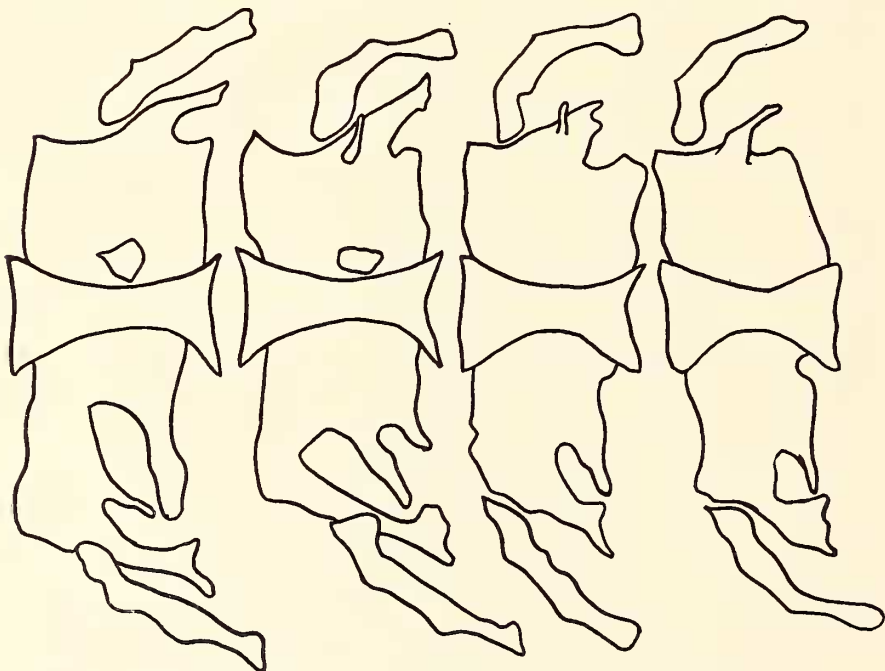
Unfortunately, the bones of the caudal fin fell to pieces in the process of clearing and staining, so that a study of them was impossible. However, a series of typical vertebrae near the tail (about the 161st to 164th), is shown in Text-fig. 7. The strength of the neural and haemal elements, for the purpose of the powerful posterior portions of the dorsal and anal fins, is apparent when compared with the slightness of corresponding elements in *Serrivomer* (*Zoologica*, Vol. XX, No. 3, Fig. 33).

Coelomic Organs: (Text-fig. 8). The coelomic organs of the 488 mm. specimen of *P. danae* differ from those of *Serrivomer* in that the liver is more extensive and the kidneys and gonads both extend farther posteriorly. While all of the specimens of *Serrivomer* examined were females, the adult *Platuronides danae* was a male, not in breeding condition.

DEVELOPMENT.

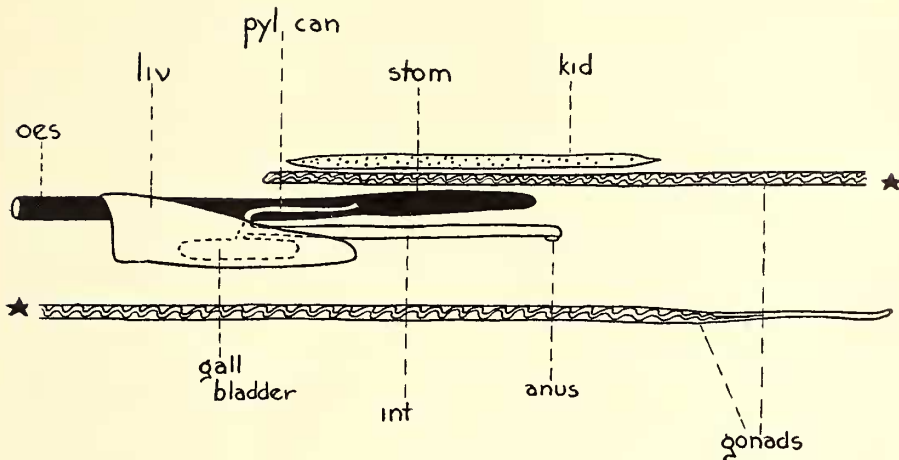
(Text-fig. 2).

The collection contains six moderately advanced larvae, measuring between 31 and 61 mm. in length in addition to the single adult, 488 mm.



Text-figure 7.

Platuronides danae. Vertebrae and fin supports of adult, standard length 488 mm., near base of tail (vertebrae about 161st to 164th). (x 78).



Text-figure 8.

Platuronides danae. Viscera of adult, standard length 488 mm.; oes: oesophagus; stom: stomach; liv: liver; int: intestine; kid: kidney. The kidneys were damaged so that it was impossible to trace the course of their ducts. (x .5).

long, described above. The characteristics of the larvae are described on pp. 332 and 333.

ECOLOGY

Seasonal and Vertical Distribution: The present material is insufficient for the drawing of any conclusions. It may be remarked, however, that five of the six larvae, measuring between 31 and 38 mm. in length, were taken during July of three different years; the sixth larva, measuring 61 mm., was caught in August and the 488 mm. adult male in May. The larvae occurred between 50 and 900 fathoms, the adult male at 1,000 fathoms.

Abundance: *Platuronides danae* is one of the rarest of all Bermuda deep-sea fishes.

STUDY MATERIAL.

The following list gives the catalogue number, depth in fathoms, date of capture, length and growth stage of each specimen of *Platuronides danae* taken by the Bermuda Oceanographic Expeditions. All were caught in the cylinder of water off the Bermuda coast described in *Zoologica*, Vol. XVI, No. 1, p. 5.

- No. 10,292; Net 145; 1,000 F.; May 31, 1929; 488 mm.; Adult.
- No. 11,866; Net 329; 800 F.; July 27, 1929; 37 mm.; Larva.
- No. 11,867; Net 330; 900 F.; July 27, 1929; 36, 38 mm.; Larvae.
- No. 12,967; Net 412; 800 F.; Sept. 3, 1929; 61 mm.; Larva.
- No. 17,039; Net 801; 900 F.; July 15, 1930; 33 mm.; Larva.
- No. 21,325a; Net 1075; 50 F.; July 11, 1931; 31 mm.; Larva.

REFERENCES.

Platuronides danae:

- Roule & Bertin, 1924. p. 61. (Preliminary description of type specimen).

Roule & Bertin, 1929, p. 48; pl. I, fig. 3; text-figs. 32-34. (1 specimen; 486 mm.; 25° 35' N. Lat., 74° 45' W. Long.; about 600 metres—1,000 metres of wire; *type specimen*).

Parr, 1932, p. 5. (Key to the species of *Platuronides*).

***Platuronides acutus* Parr 1932.**

SPECIMENS TAKEN BY THE BERMUDA OCEANOGRAPHIC EXPEDITIONS.

22 specimens; April to September, 1929 to 1931; 100 to 1,000 fathoms; from a cylinder of water 8 miles in diameter (5 to 13 miles south of Non-such Island, Bermuda), the center of which is at 32° 12' N. Lat., 64° 36' W. Long.; standard lengths from 18 to 178 mm.

SPECIMEN PREVIOUSLY RECORDED.

A single specimen; at about 850 fathoms? (10,000 feet of wire); off Bermuda; length 220 mm.

DESCRIPTION OF LARGEST KNOWN SPECIMENS.

(Text-fig. 9F).

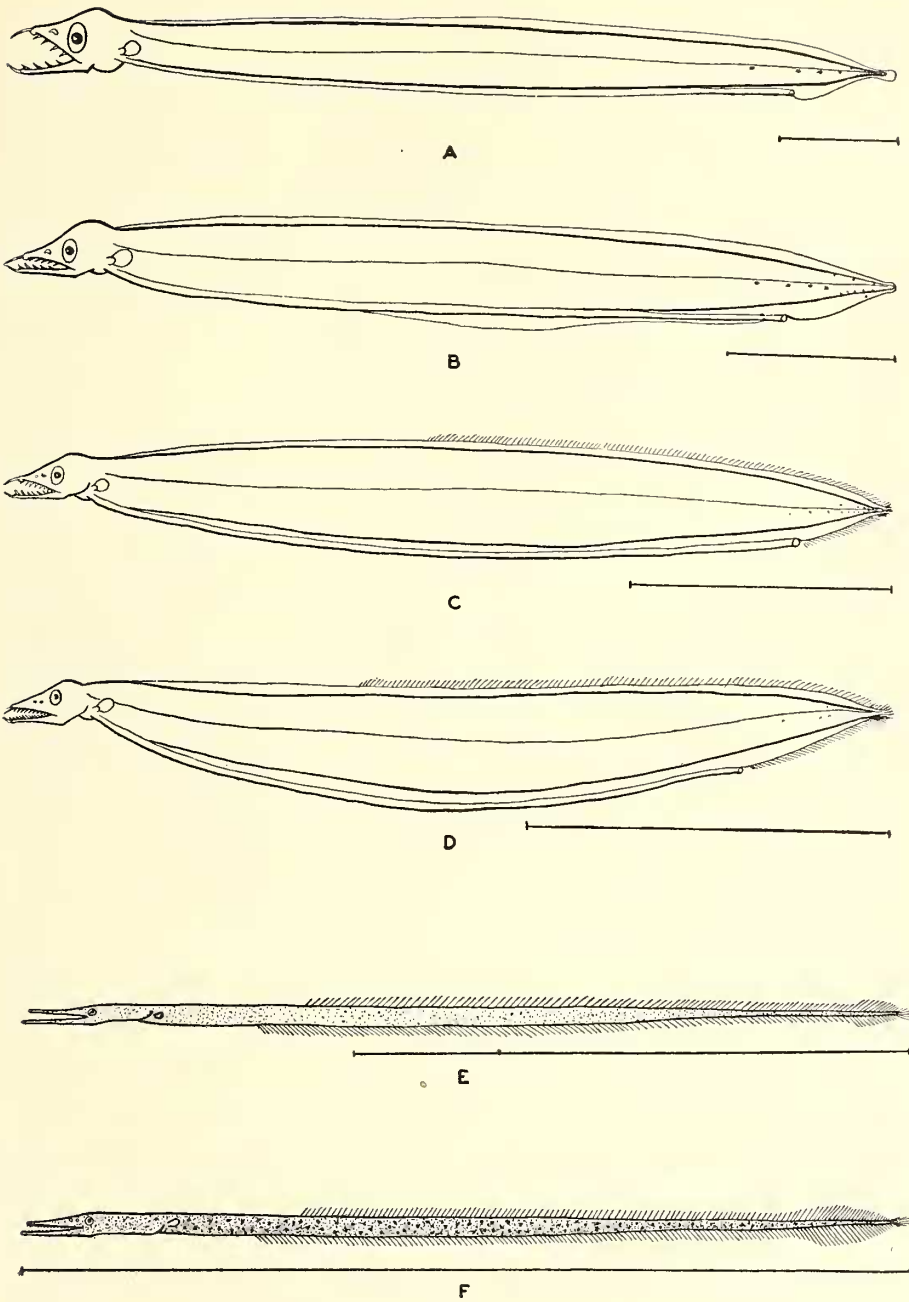
(Based upon the description of the type, and upon two transitional adolescents of the present collections, measuring 133 and 178 mm. in length, respectively).

Color: Dark brownish black, with no trace of the silvery skin characteristic of *Serrivomer*. Skin dotted with black chromatophores.

Proportions: Maximum depth (immediately behind head) in length 40 to 50 (2 to 2.5 per cent.); head in length 6.1 to 6.5 (15.5 to 16.5 per cent.); eye (horizontal) in head 16 to 24 (0.7 to 0.9 per cent. of length); snout in head 2.7 to 2.8 (5.5 to 6 per cent. of length); lower jaw slightly longer than upper; vomer projecting about one-third length of snout beyond tip of maxillary; intersphenotic width 40 to 60 per cent. greater than interorbital width; interorbital width in length 77 to 102 (.98 to 1.3 per cent.); intersphenotic width 56 to 62 in length (1.6 to 1.8 per cent.); snout to dorsal origin in length 3 to 3.2 (31.5 to 32 per cent.); snout to anal origin in length 3.7 to 4 (25 to 27 per cent.).

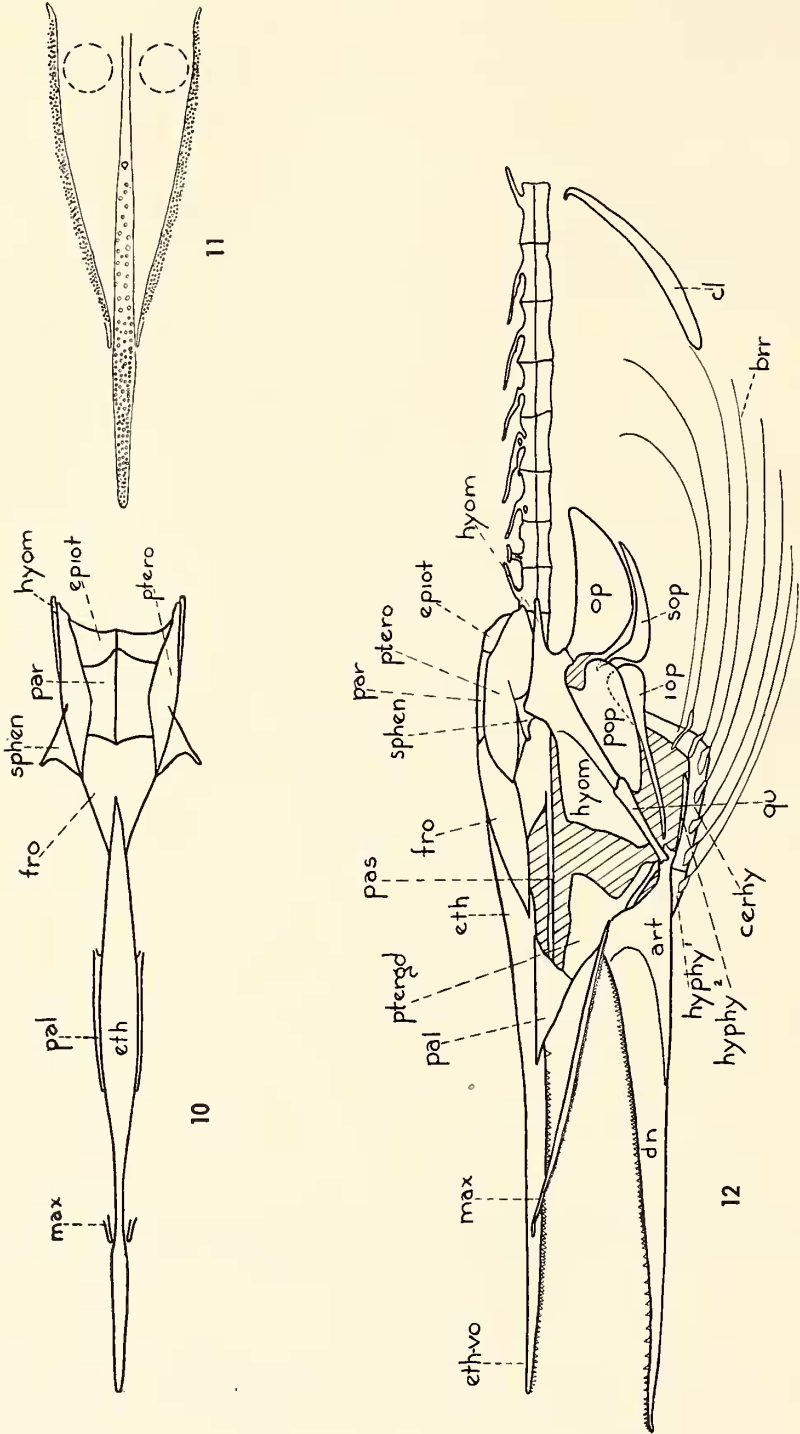
Nostrils: Non-tubular.

Teeth: (Text-figs. 10-12). The maxillary and mandibular teeth are numerous, small and pointed and arranged in from three to six irregular rows; in the mandible they are slightly larger than in the maxillary. In the 220 mm. type specimen, Parr (1932, pp. 9-10) describes the vomerine teeth thus: "Anterior portion (head) of vomer with a band of numerous small, irregularly scattered, conical teeth, about 5 or 6 wide at the broadest part, with the teeth nearest to the median somewhat larger than the others. Posteriorly these teeth become gradually larger and more compressed, and continue as a double row of alternating, compressed and somewhat decurved teeth on the shaft of the vomer. There are about 40-60 teeth in a longitudinal count on the anterior part of the vomer, depending upon the manner in which they are counted, and the posterior row on the shaft has about 8-9 teeth on each side of the median. While the latter are larger than the conical teeth on the anterior portion, they are not so large, nor quite so broad and compressed, as those of *P. ophiocephalus* or of *Serrivomer*, and their free portions do not overlap in the lateral view to nearly the same extent as in the latter forms. The anterior conical dentition also extends much farther backward in *P. acutus*, so that the posterior compressed series



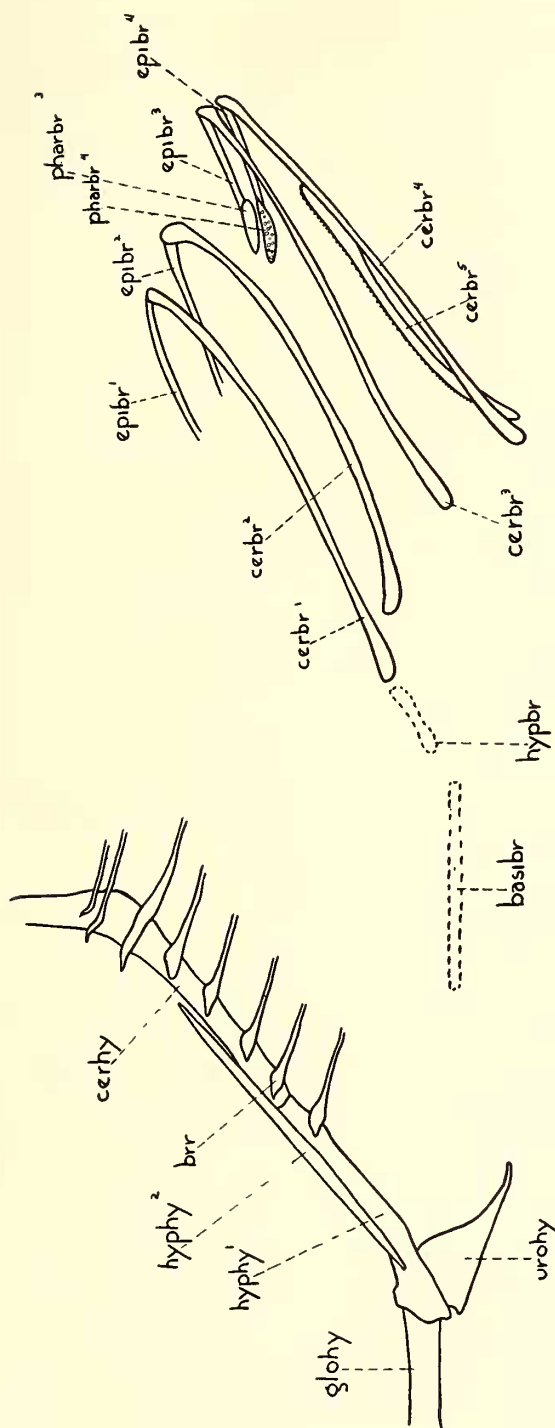
Text-figure 9.

Platuronides acutus. **A** to **D**, incl. larvae, 18, 26, 40 and 56 mm., respectively; **E**, adolescent, 92 mm.; **F**, transitional adolescent, 133 mm.



Text-figures 10-12.

Platuromides acutus. 10. Skull of transitional adolescent, dorsal view; standard length 133 mm. (x 6.8). 11. Same, teeth of upper jaw and vomer, ventral view. (x 6.8). 12. Same, bones of head, pectoral girdle and anterior part of vertebral column, lateral view. (x 6.8).



Text-figure 13.

Platuronides acutus. Hyoid and branchial apparatus of transitional adolescent, standard length 133 mm. (x 14.6).

is relatively much shorter than in *P. ophiocephalus* . . . although the vomerine dentition reaches almost to the eyes in both." In the most advanced specimens of the present collection, all smaller than the type, the teeth of the posterior part of the vomer differ less from those of the anterior part, are scarcely larger, only slightly flattened, well separated and do not yet form a regular series (see Text-fig. 11). Similar developmental stages were found in *Serrivomer*. Also, relatively more of the vomer protrudes than in the type—another growth character which is common to both genera.

Fins: Pectoral rays 6 to 8, equal in length to vertical diameter of eye, inserted at upper angle of branchial cleft; dorsal rays about 185 to 190; anal rays about 180 to 185.

Osteology: (Text-figs. 10-14). The small size of the specimen studied (133 mm.) makes difficult comparison with the large specimens of *Platuronides danae* and of *Serrivomer* which have been studied, since all of these measure around 500 mm. in length. The following points, however, are evident: The differences given on p. 335 between *P. danae* and *Serrivomer* are true of *P. acutus* also, except that the maxillary extends farther anteriorly. The relatively greater extent of parietals and frontals, and the lesser spread of such elements as the hyomandibular and the dorsal laminae of the sphenotic are obviously due to the specimen's immaturity (cf. *Serrivomer*, *Zoologica*, Vol. XX, No. 3, Figs. 26-31 and 37-40).

Since the size of the specimen is even more important in a study of the vertebral column and caudal fin than of the osteology of the head, no comparison at all can be made between these regions in *P. acutus* and in *P. danae* and *Serrivomer*.

DEVELOPMENT.

(Text-fig. 9).

Material: The collection consists of larvae, adolescents and transitional adolescents, as follows:

Larvae, 18 to 62 mm.: 14 specimens.

Adolescents, 90, 92 mm.: 2 specimens.

Transitional Adolescents, 70 to 178 mm.: 6 specimens.

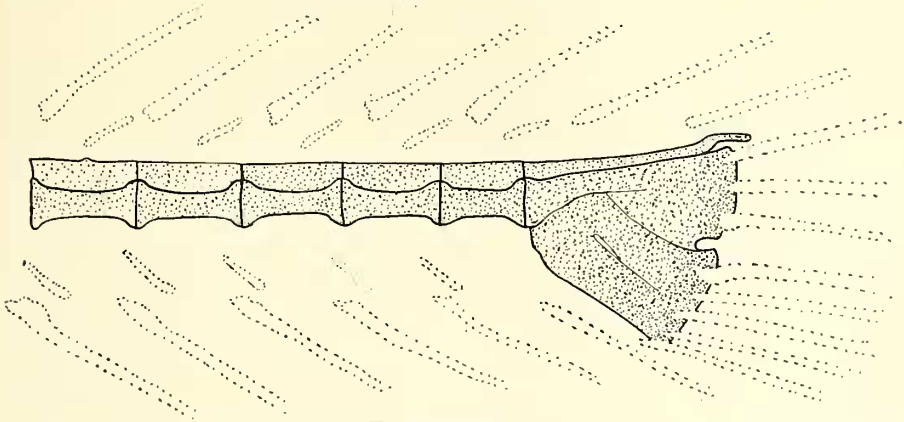
Total: 22 specimens.

Discussion: The characteristics of the larvae are described on pp. 332 and 333. Save for the difference in the position of the anus (at the 102nd to the 125th myomere, not between the 89th to 97th), the Key to the Growth Stages under the discussion of *Serrivomer* (*Zoologica*, Vol. XX, p. 80), serves very well for *Platuronides*. The shortness (70 mm.) of one of the present transitional adolescents is noteworthy: it may indicate a shrinkage of 20 mm. during the adolescent stage, or simply an unusually short elver. Evidences of the characteristic pseudo-caudal are not apparent until adolescence.

ECOLOGY.

Seasonal and Vertical Distribution: More than two-thirds of the specimens were taken in June and July, although the material is not sufficient to serve as a basis for conclusions. The larvae occurred between 100 and 1,000 fathoms, adolescents at 600 and 700 fathoms and transitional adolescents between 500 and 1,000 fathoms.

Abundance: *Platuronides acutus* is rare among the deep-sea fishes of Bermuda.



Text-figure 14.

Platuronides acutus. Posterior part of vertebral column and base of caudal fin in transitional adolescent, standard length 133 mm. (x 70).

STUDY MATERIAL.

The following list gives the catalogue number, depth in fathoms, date of capture, length and growth stage of each specimen of *Platuronides acutus* taken by the Bermuda Oceanographic Expeditions. All were caught in the cylinder of water off the Bermuda coast described in *Zoologica*, Vol. XVI, No. 1, p. 5. "Trans. Adol." stands for "Transitional Adolescent."

- No. 9,625a; Net 41; 600 F.; April 25, 1929; 92 mm.; Adolescent.
 No. 9,879; Net 89; 600 F.; May 10, 1929; 120 mm.; Trans. Adol.
 No. 10,257; Net 140; 500 F.; May 31, 1929; 123 mm.; Trans. Adol.
 No. 10,272; Net 144; 900 F.; May 31, 1929; 70 mm. Trans. Adol.
 No. 11,152; Net 239; 600 F.; June 29, 1929; 30 mm.; Larva.
 No. 11,281; Net 256; 700 F.; July 7, 1929; 92 mm.; Adolescent.
 No. 11,400; Net 277; 1,000 F.; July 9, 1929; 178 mm.; Trans. Adol.
 No. 11,459; Net 283; 1,000 F.; July 10, 1929; 42 mm.; Larva.
 No. 11,563; Net 302; 1,000 F.; July 13, 1929; 38 mm.; Larva.
 No. 12,589; Net 304; 500 F.; July 16, 1929; 62 mm.; Larva.
 No. 11,647; Net 307; 800 F.; July 16, 1929; 29 mm.; Larva.
 No. 11,698; Net 310; 600 F.; July 22, 1929; 40 mm.; Larva.
 No. 11,745; Net 315; 500 F.; July 23, 1929; 133 mm.; Trans. Adol.
 No. 12,114; Net 356; 700 F.; Aug. 8, 1929; 106 mm.; Trans. Adol.
 No. 15,659; Net 658; 700 F.; June 2, 1930; 20 mm.; Larva.
 No. 16,211; Net 730; 1,000 F.; June 26, 1930; 18 mm.; Larva.
 No. 21,018a; Net 1043; 300 F.; June 26, 1931; 26 mm.; Larva.
 No. 21,148; Net 1057; 100 F.; July 7, 1931; 29 mm.; Larva.
 No. 21,156; Net 1059; 100 F.; July 8, 1931; 30 mm.; Larva.
 No. 21,320; Net 1078; 300 F.; July 11, 1931; 33 mm.; Larva.
 No. 23,038a; Net 1243; 700 F.; Aug. 31, 1931; 26 mm.; Larva.
 No. 23,255; Net 1280; 900 F.; Sept. 9, 1931; 56 mm.; Larva.

REFERENCES.

Platuronides acutus:

- Parr, 1932, p. 8; text-figs. 4, 5. (1 specimen; 220 mm.; off Bermuda, 32° 24' 15" N. Lat., 64° 29' W. Long.; 10,000-foot wire, *type specimen*).

Family SERRIVOMERIDAE.

Characteristics: Naked deep-sea eels with the body slender and the jaws moderately attenuated; snout less than half length of head; maxillary and mandibular teeth small, erect, pointed, set in one or more rows; vomerine teeth larger, erect, compressed or conical, in one or two rows; two pairs of large nostrils and three pairs of tiny ones, all set close in front of eye; anterior nostril tubular or non-tubular; nuchal constriction absent; gill openings present, confluent; anus in advance of middle of length; pectoral fins vestigial; dorsal fin rays short, feeble; anal rays longer; both dorsal and anal confluent with caudal, sometimes (in *Platuronides*) lengthened and strengthened posteriorly to form a spatulate pseudo-caudal; lateral line pores present or absent, never large or conspicuous; caudal filament absent.

Skeleton⁴ moderately well developed; frontals and parietals paired, united by suture; supraoccipital absent; wing-like posterior processes on epiotics, pterotics and hyomandibulars; no conspicuous bony channels for sensory canal system; palato-pterygoid large and laminar; hyomandibular and quadrate forming with the mandible an angle of about 120°; mandible equal to or slightly longer than ethmo-vomer; ethmo-vomer projecting less than half the length of the maxillary beyond anterior tip of latter bone; hyoid, branchial and opercular apparatus complete, moderately well ossified; branchiostegal rays six to 12; supracleithrum absent; cleithrum and coracoids reduced; radials absent; vertical fins feebly supported, vertebrae moderately numerous, 143 to 171.

Coelom relatively small; intestine straight; a single caecal pouch; stomach black, a blind sac; liver small; kidney ending slightly behind anus; gonads dorsal, extending far behind all other organs.

Affinities: In most of their characteristics, the Serrivomeridae show distinctly less specialization than the Nemichthyidae: their jaws are shorter, bodies less attenuated, anus more posteriorly placed, palato-pterygoids well developed, opercular, hyoid and branchial apparatus complete, and vertebrae less numerous. However, in their teeth and vestigial pectoral fins they are even more highly specialized than the Nemichthyidae; it is interesting to note that in adolescent and young transitional adolescent serrivomerids the teeth, in numbers, shortness and banded arrangement, resemble those of older nemichthyids.

On the other hand, serrivomerids appear less advanced in every way than the cyemids. Their relation to *Avocettinops* Roule and Bertin (1924) and *Gavialiceps* Alcock (1889), as well as to the nearest non-nemichthyidiform groups, should prove to be of the greatest interest when these questions can be investigated through osteological studies.

Taxonomic Discussion: Five genera have been described which properly belong in this family: *Serrivomer* Gill and Ryder (1883), *Spinivomer* Gill and Ryder (1883), *Gavialiceps* Alcock (1889), *Platuronides* Roule and Bertin (1924) and *Paraserrivomer* Roule and Angel (1931). A sixth genus, *Stemonidium* Gilbert (1905), as Trewavas has pointed out (1932, p. 652), has the external characters of the serrivomerids, but the teeth of a typical nemichthyid.

The unique specimen of *Spinivomer*, a poorly described Atlantic form measuring only 147 mm. in length, has been temporarily mislaid at the United States National Museum. From the type description—which records it as bright silvery in color and as not having typical, compressed, vomerine teeth—it seems almost certain that this specimen will prove to be a young *Serrivomer* for the following reasons: first, at a similar length specimens of the latter genus are distinctly silvery, while corresponding specimens of

⁴ From studies of *Serrivomer* and *Platuronides*.

Platuronides are already dusky; second, the vomerine teeth of *Serrivomer*, as pointed out in a previous paper (Beebe and Crane, 1936, p. 85), do not attain their characteristic form and arrangement until the fish has reached a length of at least 150 mm.

Gavialiceps, a poorly known genus from the Indian Ocean, is distinguished from *Serrivomer* chiefly by the lack of pectoral fins. As Roule and Angel (1931, pp. 2-3; 1933, p. 72), have remarked, it is likely that the fins have been destroyed or overlooked because of their delicacy, and that the genus is actually synonymous with *Serrivomer* or *Paraserrivomer*. We have already (Beebe and Crane, 1936, p. 62) recorded the fact that the Atlantic specimens referred to *Gavialiceps microps* Alcock by Borodin (1929, p. 74) are typical examples of *Serrivomer beanii*.

Paraserrivomer hasta (Zugmayer), 1911, first described as an Atlantic species of *Gavialiceps*, is distinguished from *Serrivomer* chiefly by spatulate enlargements on the tips of the jaws. These swellings are very similar to those found in the Nemichthyidae, although the genus is typically serrivomerid in every other respect.

The two remaining genera, *Serrivomer* and *Platuronides*, both represented in the Bermuda collection, have already been discussed at length in the present paper and in *Zoologica*, Vol. XX, No. 3. Parr's key to these two genera (1932, p. 5) has proved satisfactory in distinguishing larger specimens. Means of identifying the larvae and elvers are set forth in the present paper on pp. 331-333.

NOTE ON SYNONYMY OF *Serrivomer beanii*.

The 173 mm. Atlantic specimen referred by Borodin (1931, p. 73 and pl. V, fig. 3) to *Nemichthys* sp. has been examined by us at the Museum of Comparative Zoology and found to be a transitional adolescent example of *Serrivomer beanii*. The *Saccopharynx*-like pouch formed by the expanded position of the hyoid apparatus can be observed in a number of *Serrivomer* in the Bermuda collection. Although the specimen is in poor condition, the character of the vomerine teeth and the anteriorly elongate branchiostegal rays leave no doubt as to its identity. This taxonomic correction should be added to the synonymy of *S. beanii* as given in *Zoologica*, Vol. XX, No. 3, pp. 61-63. (The present museum label of the specimen (M. C. Z. No. 32,299) is inscribed "*Nemichthys saccopharingoides* n. sp.?).

BIBLIOGRAPHY.

ALCOCK, A.:

1889. On the Bathybial Fishes of the Bay of Bengal. *Ann. Mag. Nat. Hist.*, Ser. VI, Vol. IV.

BEEBE, W.:

- 1931a. Bermuda Oceanographic Expeditions 1929-1930. Introduction. *Zoologica*, Vol. XIII, No. 1.
 1931b. Bermuda Oceanographic Expeditions 1929-1930. List of Nets and Data. *Zoologica*, Vol. XIII, No. 2.
 1932. Bermuda Oceanographic Expeditions 1931. Individual Nets and Data. *Zoologica*, Vol. XIII, No. 3.
 1933. Deep-sea Fishes of the Bermuda Oceanographic Expeditions. Introduction. *Zoologica*, Vol. XVI, No. 1.
 1935. Deep-sea Fishes of the Bermuda Oceanographic Expeditions. Family Derichthyidae. Introduction. *Zoologica*, Vol. XX, No. 1.
 1937. Preliminary List of Bermuda Deep-sea Fish. Based on the Collections from Fifteen Hundred Metre-net Hauls, Made in an Eight-mile Circle South of Nonsuch Island, Bermuda. *Zoologica*, Vol. XXII, No. 14.

BEEBE, W., & CRANE, J.:

1936. Deep-sea Fishes of the Bermuda Oceanographic Expeditions. Family Serrivomeridae. Part I: Genus *Serrivomer*. *Zoologica*, Vol. XX, No. 3.

BORODIN, N. A.:

1931. Atlantic Deep-sea Fishes. *Bull. Mus. Comp. Zool. Harvard Coll.* Vol. LXXII, No. 3.

GILBERT, C. H.

1905. The Deep-sea Fishes of the Hawaiian Islands. *Bull. U. S. Fish Comm.*, Vol. XXIII, Part II, Section II.

GILL, T., & RYDER, J. A.:

1883. Diagnosis of New Genera of Nemichthyoid Eels. *Proc. U. S. Nat. Mus.*, Vol. VI., pp. 260-262.

PARR, A. E.:

1932. Deep Sea Eels, Exclusive of Larval Forms. *Bull. Bingham Ocean. Coll.*, New Haven. Vol. III, Art. 5.

ROULE, L., & ANGEL, F.:

1931. Observations et Rectifications Concernant Divers Poissons Recueillis par S.A.S. le Prince Albert Ier de Monaco au Cours des Campagnes 1911 à 1914. *Bull. l'Inst. Oceanogr. Monaco*, No. 581.

1933. Poissons Provenant des Campagnes du Prince Albert Ier de Monaco. *Res. Camp. Sci. Monaco*, Vol. LXXXVI.

ROULE, L., & BERTIN, L.:

1924. Notice Préliminaire sur la Collection des Némichthyidés Recueillis par l'Expédition du "Dana" (1920-1922), Suivie de Considérations sur la Classification de Cette Section des Poissons Apodes. *Bull. Mus. Paris*, Vol. XXX, pp. 61-67.

1929. Les poissons Apodes Appartenant au Sous-Ordre des Nemichthyiformes. "*Dana*" *Exped. 1920-1922, Oceanogr. Rep.*, No. 4.

TREWAVAS, E.:

1932. A Contribution to the Classification of the Fishes of the Order Apodes, Based on the Osteology of Some Rare Eels. *Proc. Zool. Soc. London*, Part 3.